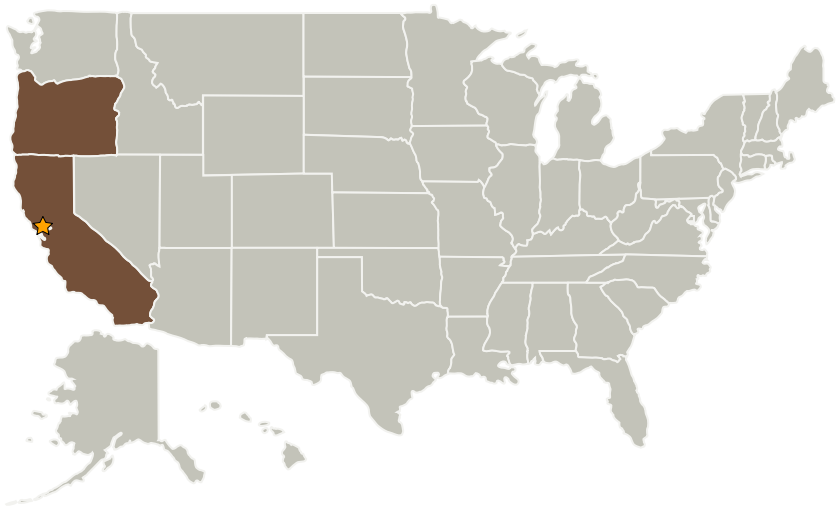
Microwave Enhanced Freeze Drying of Solid Waste, Phase I

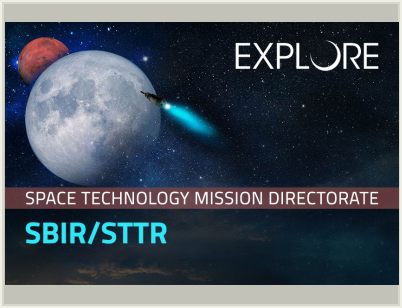
Completed Technology Project (2004 - 2004)

Project Introduction

Development of technology for Microwave Enhanced Freeze Drying of Solid Waste (MEFDSW) is proposed. The present state of the art for solid waste stabilization using lyophilization is very effective at removing water (up to 99.9%), but suffers from long processing times and high specific energy, because system equipment must operate continuously over the duration of the process. For conventional freeze drying operations, the system vacuum pump and the heat transfer system are in continuous operation. By utilizing microwave power to provide the necessary phase change energy to convert solid water to water vapor via sublimation at low pressure and temperature, the conductive heat transfer rate limitation that plagues conventional freeze dryers can be short-circuited. In addition, since the product quality of the dried solid waste is less of an issue than for food and pharmaceutical products, the sublimation envelope can be pushed. If the eutectic temperature is exceeded in localized regions in the solid waste during processing and partial melting to liquid water occurs in these regions, little significant impact, if any, will be made on the final state of the dried solid waste, but the rate of drying may be greatly accelerated, making the overall process more efficient.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
UMPQUA Research Company	Supporting Organization	Industry	Myrtle Creek, Oregon

Primary U.S. Work Locations	
California	Oregon

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Richard T Wheeler

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.1 Logistics Management